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ABSTRACT

This study of student groups working with the Chelsea Bank computer simulation concentrates on the extent to which students are involved in activities related to the Secretary's Commission on Achieving Necessary Skills (SCANS) categories and to knowledge about work place practices. Studying students using the Chelsea Bank simulations offers the opportunity to see if computer simulations can influence the way time is spent in classrooms and the extent to which learning in a simulated environment can transfer beyond that environment. In the first study, researchers analyzed samples of nonsystematically gathered videotapes of 13 groups of 3 high school and middle school students using the simulations. The second study involved the systematic gathering and analysis of videotapes of students using the Chelsea Bank scenarios and case study interviews and examples of student assignments. Two groups of three students in an eighth-grade class and two groups from a ninth-grade class were studied. The first study suggested that students using the simulations were more engaged than students in traditional classrooms, and that they were actively processing information to solve problems almost the whole time they were being taped. In the second study, in which the taping procedure was less obtrusive, similar results were seen. In both studies, students demonstrated considerable involvement with SCANS competencies in the areas of resource identification and use, interpersonal skills, information acquisition and processing, and monitoring performance and recognizing consequences of actions. Evidence for transfer of skills and information has not yet been analyzed completely but the presence of transfer has been supported. (Contains three references.) (SLD)

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ED 410 237

# Chelsea Bank: SCANS and Workplace Knowledge

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## OVERVIEW

This study of student groups working with the Chelsea Bank computer simulation concentrates on the extent to which students are involved in activities related to the Secretary's Commission on Achieving Necessary Skills (SCANS) categories and to knowledge about workplace practices. Data includes videos of students working on the simulation scenarios, interviews with students and their teachers, and students' classroom work. Chelsea Bank simulations offer the opportunity to examine the degree to which computer simulations can productively influence the way time is spent in classrooms and the extent to which learning in a simulated environment can transfer beyond that environment.

## RESEARCH QUESTIONS

The study addresses the following two questions:

1. To what degree do students using the Chelsea Bank simulation perform activities related to the SCANS (Secretary's Commission on Achieving Necessary Skills) categories—i.e., Resources, Interpersonal, Information, Systems, Technology, Basic Skills—and demonstrate increased knowledge of workplace practices?

2. To what extent are SCANS competencies associated with Chelsea Bank scenarios transferred to other school classes, work experiences, and other non-school activities?

## LITERATURE REVIEW

In the early 1990s, a commission established by the U.S. Departments of Labor and Education brought together researchers and representatives from schools, businesses and organized labor to establish what skills were required for productive participation in the new workplace. One of the outcomes was a conceptual framework which consisted of several categories (i.e. the SCANS categories) which outlined an inter-related set of basic, cognitive, interpersonal and technological skills considered necessary for productive functioning in the workplace. These SCANS categories have served as a framework for examining, modifying and developing both school and workplace curricula.

The SCANS framework has also served as a basis for constructing observational instruments and interview questions used to analyze the data in this study to determine the extent to which the Chelsea Bank simulations provide opportunity and support for student learning in relation to skills categories identified by the joint commission. A brief summary of SCANS categories (U.S. Department of Labor, 1991) follows below:

Resources—identifies, organizes, plans and allocates resources;

Interpersonal— works with others on teams, teaches others, serves clients, exercises leadership, negotiates, works with diversity;

Information— acquires, organizes, interprets, evaluates, and communicates information;

Systems— understands complex inter-relationships, can distinguish trends, predicts impacts, monitors and corrects performance;

Basic skills—reading, writing, math, oral (listening/speaking).

SCANS publications (1991, 1992) also recommended changing the relatively passive school experiences of most adolescents. In the middle 1980's, a team of researchers led by Goodlad (1984) had observed 27,000 students in over 1000 classrooms. Among the conclusions drawn from these broad-based, extensive observations was the fact that most of the time spent in schools by students involved students passively listening to teachers. Over 70% of academic time in observations was classified as "talk" and 75% of that time was teacher's talking and students listening. Nearly all of this teacher talk was to large groups of students with only a tiny fraction allocated to instructing individuals or small groups. Almost no time was spent practicing any of the higher level skills in the SCANS categories and only listening (among the basic skills of reading, writing, math, speaking and listening) received much practice or attention. An implicit sub-goal of this study is to determine the extent to which Chelsea Bank simulations reverse the teacher talks while students listen arrangement of many traditional classrooms.

## METHOD

### The Two Studies

Study One: Preliminary to the current, in-process, study (Study Two below), the authors analyzed samples of non-systematically gathered videotapes of students using Chelsea Bank simulations. These tapes consisted of the raw footage for a video made for educational purposes for Classroom Inc (CRI). The footage was shot at one high school and one middle school during 1995, and contained about five hours of tape showing students working on the simulations.

Study Two: Starting in Fall 1996, the authors began a systematic gathering and analysis of videotapes of students using Chelsea Bank scenarios and of case study interviews, and examples of student assignments. Two classes at two schools are involved in this study: an 8th grade class at a middle school and a 9th grade class at a high school.

Both studies are being used to address Research Question 1, about activities related to SCANS and the workplace. Study Two data is also being used to address Research Question 2, about transfer of SCANS competencies to other activities beyond the simulations.

## Subjects

Study One: For the CRI educational video, students at a high and a middle school, both in New York, were videotaped using the Chelsea Bank simulations. In all, 13 groups of three students were included in the tapes. The teachers of these students were also taped when they joined student discussions, asked questions, or provided guidance for student work.

Study Two: Two classes at two schools are involved in case studies: an 8th grade class at a middle school and a 9th grade class at a high school. At each school, two groups of three students are being studied closely; one group is being videotaped and the other is not, so as to determine the effect, if any, of singling out a group for taping. All four groups are being extensively interviewed and their assignment work connected with Chelsea Bank is being gathered for analysis. Also their teachers are being interviewed about the simulation overall and about the case study students in particular. Student work of students not directly involved with observations and interviews is being gathered as a means for providing a stronger sense of context.

## Data-gathering Techniques

Study One

This study consisted entirely of an analysis of videotapes made for Classroom Inc. as the raw footage for an educational video. These 22 hours of tape contained sequences of students working on Chelsea Bank, interviews with students and teachers, and other classroom activities associated with Chelsea Bank. Of these 22 hours, about five hours showed students working on the simulation, and it was these five hours that were used in the study and analyzed in the following manner.

The purpose of the coding scheme described here is to analyze the nature of the learning that takes place when students use the Chelsea Bank simulation. The coding scheme is built around SCANS competencies—Resources, Interpersonal, Information, Systems and Technology—plus the four basic skills of Reading, Writing, Math and Oral (i.e., speaking/listening) as they are displayed by students on the videotapes. (This scheme was used to analyze videotapes of student group work for both Study One and Study Two.) In this coding scheme, video sequences of student group work were coded on a minute-by-minute basis for occurrence of the SCANS competencies. The coding

took account of time spent by students on activities involving these categories, as well as recording instances of brief interactions that relate to such categories as Resources and Systems.

Each minute of the video sequences was scored for every category of SCANS competency and basic skill (described above). For each minute, the scoring was on a 0 - 2 scale, where less than 20 seconds scored 0, 20-40 seconds scored 1, and 40-60 seconds scored 2. In addition, any isolated occurrence of a competency (usually Resources or Systems) was noted and counted. (This counting of instances as opposed to rating time of involvement was used in the two categories of Resources and Systems because looking up resources like credit data or noting causes and effects upon systems almost always took less than 20 seconds) Two researchers coded all of the sequences independently (and achieved about 85% inter-rater agreement). They then discussed any discrepancies and reconciled them, either from notes taken during their separate viewing or by reviewing together the relevant minutes of videotape.

The number of categories was expanded slightly beyond the original broad SCANS categories, by sub-dividing the Interpersonal, Information and Systems competencies in the following ways. The Interpersonal competency was divided into two categories: interactions within the student group and interactions between group and teacher. Also, because the students were dealing with information virtually all the time, the Information competency was divided into three categories: acquire and organize information, interpret and evaluate information, and communicate information. The Systems competency occurred in two kinds of ways: in extended discussions as a group predicts the impact of their actions and tries to understand the relationship between the bank, the teller/CSR and the customer (recorded as a percentage of time), and in brief incidents when students monitor and correct each others' performance (recorded as a number of instances). The Resources competency occurred only as brief incidents in decisions to consult the manual or account information. Therefore this was recorded as a number of instances. The Technology competency was not really applicable to the simulation, because it refers to "working with a variety of technologies and choosing the appropriate tool for the task" and Chelsea Bank involves computer use without choice. In fact, the computer technology had become so problem-free as to be almost invisible in student use of Chelsea Bank scenarios after the first session.

In order to explain the meaning of each of the expanded categories, they are described below with examples of the types of activities that occur in Chelsea Bank.

Resources—*identifies, organizes, plans and allocates resources*
—e.g., choosing to consult the on-screen manual, memo or accounts.

Interpersonal— *works with others on teams, teaches others, serves clients, exercises leadership, negotiates, works with diversity*

—e.g., students discussing their decision choices, working together to count cash, and cooperating as they write about the effects of a decision (more passive events, such as one student reading aloud, are not included); teacher discussing the problem with a group.

Information— *acquires, organizes, interprets, evaluates, and communicates information*

- acquires/organizes: students reading the start of a scenario, listening to questions from the teacher, consulting the manual, and counting cash;
- interprets/evaluates: selecting from among the decision choices and discussing the effects of a decision;
- communicates: writing reports on the problem, the effects on bank, teller and customer, and the rules for good banking.

Systems— *understands complex inter-relationships, can distinguish trends, predicts impacts, monitors and corrects performance*

- extended discussions about the impact of decisions and understanding the relationship between the bank, the teller/CSR and the customer;
- brief examples of monitoring and correcting of spelling or pronunciation, or where to find information in the manual.

Reading— e.g., the start of a scenario, the materials presented to the teller by a customer, the manual and decision options.

Writing— e.g., typing reports on the problem, the effects on bank, teller and customer, and the rules for good banking.

Math— e.g., counting cash.

Oral— e.g., reading aloud, discussing decisions, listening to teacher.

Study Two

The data for this in-process study consists of videotapes of students using Chelsea Bank, interviews with students and teachers, and student work from assignments which parallel the Chelsea Bank simulations (i.e. writing assignments, team projects, etc.)

**Video-coding:** Researchers are visiting the two schools in the study when the classes are working on selected scenarios of Chelsea Bank: Scenarios 3, 8, 11 and 15. One group at each

school is being videotaped doing these scenarios, and the tapes are being analyzed with an expansion of the scheme described above for Study One.

**Interviews:** During visits to the schools, researchers interviewed students and their teachers about the current scenario and more general issues connected with Chelsea Bank. Interviews gathered information about SCANS categories, transfer, and student views about the scenarios. The four groups of case study students are interviewed together in their groups of three after working on the current scenario, with interviewers seeking a response from each student. Their teachers are interviewed with a protocol containing parallel questions, seeking confirmation of the information obtained from the students. Between visits, teachers were also interviewed by telephone. Student, and to some degree teacher, questions focus on the students' approach to the problems presented in a scenario, what they had learned relating to SCANS categories, and what connections they saw between Chelsea Bank and their other classes and out-of-school activities. Questions asked of students were of the following nature:

- You've just completed Scenario 3 with Rosa Rodriguez. I'd like you to take a moment to remember how you solved that problem.
  What was hard or tricky in the scenario? Please give me examples.

- When you disagree with a team-mate about what decision to make, how do you decide what to do? Tell me what you've learned about making decisions.
  Please give me examples of when you learned these things.

- Have you noticed connections between what you do in Chelsea Bank and your other classes? Please give me examples.

- Have you noticed connections between what you do in Chelsea Bank and your lives outside school? Please give me examples.

Questions asked of teachers included the following:

- What do you think are the two most important things your students learned in Scenario 3? Please explain.

- Working in groups involves many skills. Tell me what your students have learned in Chelsea Bank about sharing jobs. Please give me examples of how they learned these things.

- In Chelsea Bank, a person has to deal with lots of information. Tell me what your students have learned about how to find information. Please give me examples of how they learned these things.

- Tell me what your students have learned about predicting the results of their actions. Please give me examples of how they learned these things.

- Do you see or hear about the effects of your students' learning in any of their other classes? Please give me examples.

Interviews conducted during school visits were audio taped and later transcribed. These notes, and those from the telephone interviews with teachers, were then analyzed for mentions of SCANS categories and transfer beyond the simulation.

**Student assignments**: Student assignments are currently being analyzed for examples of SCANS categories and of transfer. Decision-making rules for classification have yet to be developed.

## Procedure

Study One: The CRI educational video footage was shot in Spring 1995. During 1995-96, the researchers for this study watched this footage to locate sequences of students using the Chelsea Bank scenarios. These sequences were then coded according to the technique described above and amounts of time spent on the various SCANS categories were summarized across the student groups, in total and for when the teacher was absent or present. .

Study Two: During 1996-97, researchers are systematically videotaping one group of students at each of the two schools as they work on Scenarios 3, 8, 11 and 15 of Chelsea Bank. (This is still in progress.) These sequences are being coded according to the technique described above and amounts of time spent on the various SCANS categories are being summarized across the student groups, in total and for when the teacher is absent or present.

During the school visits for videotaping, researchers are also interviewing students and teachers at the two schools. Two groups of students (the one being videotaped and the other) are being interviewed after they work on the scenario and are being asked questions about how they did that scenario, as well as more general questions about what they are learning from the simulation. The teachers are being interviewed about their approach to Chelsea Bank, the progress of their

class and, in particular, the progress of the two study groups. The teachers are also being interviewed by telephone between visits, in order to track the case study groups during the other scenarios and other class activities. In addition, the teachers are copying and sending to the researchers the assignment work of the case study students. The interview notes and student work is currently being analyzed for the presence of SCANS categories and for evidence relating to workplace preparation.

## Data Analysis

Analysis of videotapes

Two analyses are presented: one from Study One, which is based on videos shot for the Classroom Inc. educational video, in semi-artificial situations, and the other from Study Two, shot in real classrooms.

The first analysis relates to five hours of student group work, nearly all of which is accounted for by 14 sequences showing 13 different student groups. Such a range will allow conclusions to be drawn about the overall amounts of time that students spend on each SCANS category while engaged in the Chelsea Bank simulation.

The second analysis relates to the early stages of Study Two, in which Scenarios 3, 8, 11 and 15 are being videotaped at two schools. The present data includes Scenario 3 and Scenario 8 from both schools. Here it will be noticed that no mathematical activity takes place, because of the nature of the two scenarios analyzed.

Analysis of interviews and student work

After interviews with students and teachers have been transcribed, the interview notes are being searched for mentions of SCANS categories and of transfer to other activities. A similar procedure will be used for student assignments. Both the number of mentions and the emphases of the interviewees are being used to assess the importance of a particular category to the student or teacher. Quotations from these interviews that mention instances of SCANS applications or transfer are also being gathered to provide additional evidence.

# RESULTS

This results section addresses first the SCANS analysis of the videotapes in both Study One and Study Two, and the light that this throws on Research Question 1:

To what degree do students using the Chelsea Bank simulation perform activities related to the SCANS (Secretary's Commission on Achieving Necessary Skills) categories—i.e., Resources, Interpersonal, Information, Systems, Technology, Basic Skills—and demonstrate increased knowledge of workplace practices?

Following that are provisional indications from the analysis of interviews and student work in relation to Research Question 1 and Research Question 2:

To what extent are SCANS competencies associated with Chelsea Bank scenarios transferred to other school classes, work experiences, and other non-school activities?

## Videotape Analysis

In both studies, student engagement in the simulation activity is high. This is perhaps best illustrated by the facts that students in Study One are actively engaged in information-processing 95% of the time and in Study Two 78% of the time. The very high engagement level in Study One appears to be caused by the intensity with which these students were being observed by a camera crew, production staff, and their teacher. However, the level of engagement in active learning in the normal classroom situations of Study Two is still quite high compared with conventional classrooms, in which students spend most of their time listening: 70% of academic time is talk, and 75% of this is teacher talk (Goodlad, 1984, p. 229).

In particular, students doing Chelsea Bank spend more time reading and writing than students in conventional classrooms. Goodlad (1984, p. 107) reports that junior and senior high school students spend about 2-3% of their time reading and 15-20% writing. The findings of this study show that students working on Chelsea Bank scenarios spend about 20-30% of their time reading and 20-35% writing. Since multiple activities often occur simultaneously during a one-minute period, total percentages sometimes exceed 100%.

There follows a summary of the results of the videotape analysis in Study One and Study Two, and tables of the full results of the analysis. (See pp. 4-5 above for descriptions of the SCANS categories and examples of activities in Chelsea Bank related to them.)

### Summary of Study One Video Results

- The students (and only occasionally the teacher) are speaking and listening for 81% of the time, and are engaged in interpersonal interactions for 57% of the time.

- Processing of information takes place 95% of the time: 48% in acquiring/ organizing, 29% in interpreting/evaluating, and 18% in communicating.
- Systems activities take place 23% of the time, Systems incidents take place 26 times, and incidents related to Resources take place 38 times.
- Reading occurs for 33% of the time, Writing for 20% of the time, and Math for 6% of the time. Both reading and writing occur less often in the presence of the teacher: reading decreases from 39% to 22% and writing from 23% to 14%.

## Summary of Study Two Video Results

- The students (and occasionally teacher) are speaking and listening for 50% of the time, and are engaged in interpersonal interactions for 35% of the time.
- Processing of information takes place 78% of the time: 31% in acquiring/ organizing, 10% in interpreting/evaluating, and 37% in communicating.
- Systems activities take place 20% of the time, Systems incidents take place 18 times, and incidents related to Resources take place 21 times.
- Reading occurs for 22% of the time, Writing for 35% of the time, and Math for 0% of the time. Both reading and writing occur less often in the presence of the teacher: reading decreases from 24% to 12% and writing from 38% to 24%.
- Activity is less intense than in the Study One tapes, probably because the students feel less under observation and so less obligated to perform without social interruption. This is particularly true of the Oral category: in the Study One tapes students were repeatedly reminded to read and think aloud.
- However, more time is spent writing in Study Two than in Study One.
- Oral and Interpersonal activity is lower than for the Study One tapes also because two of the four groups in the present provisional analysis had only two of their three students present on the days of videotaping.

The times spent on the expanded SCANS categories are set out in the tables below. The percentages of time are given, in each case, for the whole time recorded, those minutes that the teacher is not with the group, and those minutes that the teacher is present. This division is chosen because the students' activities change markedly when the teacher is there. (Because more than one category is usually applicable to any activity, the percentages in any column add up to considerably more than 100%.)

## Study One: Video Results

The results below relate to five hours of student group work, nearly all of which is accounted for by 14 sequences showing 13 different student groups. Percentages of time are given for the whole five hours (in fact, 283 minutes), the 171 minutes that the teacher is not with the group, and the 112 minutes that the teacher is present.

| Category | All minutes | Teacher absent | Teacher present |
|---|---|---|---|
| Resources | 38 instances | 25 instances | 13 instances |
| Interpersonal (student/student) | 42% | 56% | 21% |
| Interpersonal (teacher/student) | 15% | — | 37% |
| Information: acquire/organize | 48% | 52% | 42% |
| Information: interpret/evaluate | 29% | 24% | 37% |
| Information: communicate | 18% | 21% | 13% |
| Systems: predict/understand | 23% | 20% | 26% |
| Systems: monitor/correct | 26 instances | 19 instances | 7 instances |
| Reading | 33% | 39% | 22% |
| Writing | 20% | 23% | 14% |
| Math | 6% | 8% | 3% |
| Oral | 81% | 79% | 84% |

## Study Two: Video Results

The preliminary results below relate to 86 minutes of student group work recorded in four sequences showing two different student groups. Percentages of time are given for the whole 86 minutes, the 69 minutes that the teacher is not with the group, and the 17 minutes that the teacher is present.

| Category | All minutes | Teacher absent | Teacher present |
|---|---|---|---|
| Resources | 21 instances | 14 instances | 7 instances |
| Interpersonal (student/student) | 28% | 33% | 6% |
| Interpersonal (teacher/student) | 7% | — | 35% |
| Information: acquire/organize | 31% | 29% | 38% |
| Information: interpret/evaluate | 10% | 11% | 9% |
| Information: communicate | 37% | 38% | 32% |
| Systems: predict/understand | 20% | 22% | 12% |
| Systems: monitor/correct | 18 instances | 16 instances | 2 instances |
| Reading | 22% | 24% | 12% |
| Writing | 35% | 38% | 24% |
| Math | 0% | 0% | 0% |
| Oral | 50% | 43% | 76% |

## Interview comments and student assignments

Through an examination of interview data and student work gathered in Study Two (which is still in process), this section addresses both Research Questions:

1. To what degree do students using the Chelsea Bank simulation perform activities related to the SCANS (Secretary's Commission on Achieving Necessary Skills) categories—i.e., Resources, Interpersonal, Information, Systems, Technology, Basic Skills—and demonstrate increased knowledge of workplace practices?

2. To what extent are SCANS competencies associated with Chelsea Bank scenarios transferred to other school classes, work experiences, and other non-school activities?

SCANS activities

Interpersonal: Students work together in teams on Chelsea Bank and teachers tend to emphasize this aspect of learning during scenarios as well as on non-scenario days. Therefore this is a topic on which students comment very often and they learn early on how to cooperate with others in their group. Below are some sample indications of this:

> "Like if you gotta say something then you say it. Then you be quiet. Then the next person say what they gotta say. Then the other person be quiet." (Student interview of 11/18/96)

> "Like, when someone is talking you would like be quiet so that you could listen and understand them. And when you're talking they have to, like, be quiet and, like, when you're talking so they can understand what you're saying." (Student interview of 11/18/96)

> "It's easy 'cause if one of us has an idea that's better than the other one, then we use her idea, and then we just go on from there. We add on from there." (Student interview of 11/18/96)

> "If you don't agree, you can come to consensus, . . . instead of everybody saying 'I pick this' and 'I pick that'." (Student interview of 1/9/97)

Another aspect of interpersonal communication is negotiating with others in difficult situations. In a writing assignment parallel to one scenario, students are asked to explain how they would deal with a customer who is a former neighbor, who was previously mean to them, and who says, "You tellers are all overpaid, lazy and can't add." One student's written explanation of how she would respond indicates she has understood the parameters of interpersonal relationships in professional situations. She writes:

"I think I did a good job because I ignored his rude comments and did what I had to do. I told him to go and fill out another deposit slip, or stay and just give me $63.68 and keep the rest. He picked his second choice and I deposited the money and waited for my next customer."

Teamwork and interpersonal functioning sometimes extends to thinking of another person as a Resource:

"Well, we try to sort it out by things that people do best. Like F, he draw, right? He can draw real good. And I can write. I can make up stories really good. And W, she can write and think of ideas real quick." (Student interview of 11/18/96)

Also students learn from their mistakes when teamwork goes wrong:

"Like, remember that time we were working with Mr. Gumble and we got it wrong? Well, me, W and F, well W had it right this time except we didn't listen to her 'cause we thought she was crazy. And we weren't trying to hear what she had to say." (Student interview of 11/18/96)

The other major activity in Chelsea Bank is gathering and using Information—mostly connected with banking, so that they are learning about how banks operate at the same time. Students describe how this process works:

"Most of the time, you look in the manual to find a rule of good banking. You go by certain things in customer service—things you can and cannot do. See if the check is negotiable, and if they have proper ID, and anything else." (Student interview of 1/9/97)

"Most of the stuff that we do is important because we gotta check what they gave us. We gotta count it. We gotta check the account and see if we can handle it—the withdrawal or deposit." (Student interview of 11/18/96)

Transfer of learning

Transfer to other classes: Students sometimes make explicit connections between the skills they are acquiring in Chelsea Bank and their work in other classes. For example, this student is talking about putting information together so that it all makes sense:

"Well, you gotta get it little by little, then you put it together. Like a story, right. Like a poem that we had to read for Miss K's class. You take it verse by verso and then you can put it

together at the end. So we take all of our ideas, then we put it together with the solution at the end." (Student interview of 11/18/96)

Transfer out of school: Students also make connections to the world outside school, including taking an interest in real banks and making more general transfers:

"I opened my personal account, in the bank around my house, and I go there sometimes just to walk around. You look inside the bank and see what they're doing. I know what goes on in a bank now, but otherwise before this I couldn't tell you anything about a bank." (Student interview of 1/9/97)

"When my mother tells me, she'll say, 'Be home at 11.' And I know *she* will be home at 11:30. So I say to myself, 'Well, since my friends are going out, I could stay out a little longer and then get upstairs before she gets home.' And then I say, 'But then if I do that and she does get home a little earlier and I get upstairs late, I'll be in trouble and I won't be able to go outside the next day.' I weigh my actions and find the consequences when I am in any situation. . . . In Chelsea Bank there really are consequences and now I pay more attention to them." (Student interview of 2/6/97)

## DISCUSSION AND CONCLUSIONS

Results of the two studies will be discussed in the following fashion:

1) comparison to traditional classrooms,
2) evidence of SCANS competency use in the computer simulations, and
3) indications of transfer beyond the computer simulations.

**Comparison to traditional classrooms:** Data from Study One was drawn from 13 student groups who were taped for an educational video by a professional camera team using lights, special staging, and a relatively short shooting schedule. In these special circumstances, results indicated a fairly diverse sampling of students using Chelsea Bank computer simulations were considerably more actively engaged with learning than were students in Goodlad's earlier observations of traditional classrooms. Study One computer simulation students were actively processing information to solve problems nearly the entire time they were being taped (i.e. 95% of the time). During any given sequence of time, students were reading information from the screen, discussing meanings and choices, making decisions, and composing written speculations about consequences of actions upon customers, the bank, and upon themselves. Reading occurred during a substantial portion of 33% of the minutes observed and writing during a substantial portion of 20% of the minutes observed. This relatively high involvement with literacy

compares positively with students in classrooms observed by Goodlad who spent well over half their time listening to teachers and engaged in reading only 2-3% of the time and writing (mostly in the form of worksheets and answering chapter questions) about 15-20% of the time.

It seems possible that the artificial nature of camera lights and one-time video shooting may have had some impact upon student performance in Study One. To somewhat mitigate the possible impact of professional video shooting, Study Two uses regularly scheduled, non-professional video shooting in an ordinary classroom setting. Initial data suggests that students are actively engaged processing information, though less than Study One students (78% vs. 95% of the time). This active engagement is still substantially more than students in traditional classrooms. Reading time drops to 22% from the 33% demonstrated by Study One students, but is still considerably higher than the 2-3% of time demonstrated by students in Goodlad's study. Study Two students spend more time writing than did Study One students (35% vs. 20%) and nearly double the time reported in the Goodlad study. By way of passing observation, students taped in Study Two do not appear to be aware of the video, appear free to take some conversational breaks which diverge from the bank scenarios, and yet seem actively interested and engaged the vast majority of the time.

**Evidence of SCANS competency use:** Both Study One and Study Two students demonstrate considerable involvement with SCANS competencies in the areas of: 1) resource identification and use, 2) interpersonal skills needed on teams attempting to make decisions, 3) acquiring, processing and communicating information, and 4) monitoring performance and recognizing the consequences of actions upon systems. Detailed comparison of the 86 minutes of tape analyzed from Study Two with the full data from Study One is not yet warranted other than to note that Study Two percentages in most categories (with the exception of communication) are less than Study One percentages. This may be partially attributable to the slightly lower engagement in a normal classroom setting and may also be partially attributable to the fact that Study Two data is thus-far drawn only from early scenarios in the Chelsea Bank sequence of 15 scenarios. Student and teacher interviews as well as examples drawn from student written assignments indicate that students are consciously aware of their performance in these SCANS areas and indeed can often articulate their mistakes and improvement.

**Transfer beyond the computer simulations:** The evidence for transfer in interview and assignment data has not yet been completely analyzed. There are, however, clear indications that students are aware of what they have learned about banks, working with others, organizing information, and thinking through consequences of actions. Students are making and articulating

connections to their activities in other classes as well as to their functioning outside of school. The presence of this transfer is clear, though the degree and depth is yet to be determined.

**Future analysis:** As more complete data for Study Two is gathered and analyzed, we hope to be able to document conclusions about:

1) student growth while moving through scenarios,
2) the impact of teacher presence and absence from student groups,
3) the extent and depth of SCANS competency transfer, and
4) the integration of computer simulation activities with other classroom and school activities.

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